

Progress of Sandia's Environmental Restoration Operations



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Overview of Sandia's Environmental Restoration Operations

- Mission – Identify, characterize & remediate sites where hazardous &/or radioactive materials have been released
- Scope: 315 sites
 - Legally - Solid Waste Management Units or Areas of Concern
 - For presentation - Environmental Restoration sites or “ER sites”
- All activities regulated by New Mexico Environment Department (NMED) under the 2004 Compliance Order on Consent (COoC)
- DOE/NNSA and Sandia Corporation are in compliance with: Compliance Order on Consent, Federal and State requirements



Overview of Sandia's Environmental Restoration Operations

- Very successful, completed corrective action at 302 of 315 ER sites
- 13 ER sites remain in corrective action process
- Presentation will review progress in completing corrective action at these 13 ER sites
- Focus on progress made during last 6 months
- Provide summary of work scheduled for 2017



Remaining 13 ER Sites

- 6 “Soil sites”
- 3 “Active mission” sites with deferred corrective action
- 1 Mixed Waste Landfill
- 3 Groundwater Areas of Concern
 - Burn Site
 - Tijeras Arroyo
 - Technical Area V



Remaining 10 ER Sites

6 Soil sites

~~3 “Active mission” sites with deferred corrective action~~

1 Mixed Waste Landfill

3 Groundwater Areas of Concern

Burn Site

Tijeras Arroyo

Technical Area V



Remaining 10 ER Sites

- 6 Soil sites (**Five plus One**)
 - 1 Mixed Waste Landfill
 - 3 Groundwater Areas of Concern
 - Burn Site
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Five Soil Sites

- “Soil sites” to separate them from the Mixed Waste Landfill (ER Site 76) and the groundwater areas of concern
- A 2010 letter from NMED requested additional groundwater characterization of these ER sites (ER sites 8/58, 68, 149 & 154)
- All required groundwater characterization work has been completed and the results documented
- Received Certificates of Completion from NMED in letter dated January 19, 2016
- Next step - request Corrective Action Complete status from NMED, with public meeting and public comment period



One “New” Soil Site

- “New” release site, discovered in 2012, ER site 502
- Voluntary corrective actions completed at this site
- Remaining concentrations in soil below cleanup criteria
- Received Certificate of Completion from NMED in letter dated February 29, 2016
- Next step - request Corrective Action Complete status from NMED, with public meeting and public comment period



Remaining 10 ER Sites

6 Soil sites (five plus one)



1 Mixed Waste Landfill

3 Groundwater Areas of Concern

Burn Site

Tijeras Arroyo

Technical Area V

Mixed Waste Landfill





Mixed Waste Landfill (ER Site 76)

- October 2014 DOE and Sandia requested a Permit Modification, for NMED to grant Corrective Action Complete with Controls status to the MWL
- Public requested a Public Hearing
- NMED hosted 2 meetings in attempts to resolve differences without Public Hearing, meetings unsuccessful
- Public Hearing was held July 8 – 11, 2015
- Hearing Office issued Hearing Officers Report October 13, 2015



Mixed Waste Landfill (ER Site 76)

- On February 12, 2016, Secretary of Environment issued the Final Order granting the status of “Corrective Action Complete with Controls” to the MWL
- Final Order adopts Hearing Officer Report and included two additional conditions:
 - 5-Year Report must include an evaluation of full excavation with onsite disposal in a RCRA Subtitle C landfill unit (due January 2019)
 - DOE/Sandia must either provide any inventory records not yet disclosed, or document that all records were previously provided
- Continue the comprehensive monitoring of the: groundwater, air, surface soil, the biota & the unsaturated zone, as set forth in the Long Term Monitoring and Maintenance Plan



Remaining 10 ER Sites

6 Soil sites (five plus one)

1 Mixed Waste Landfill

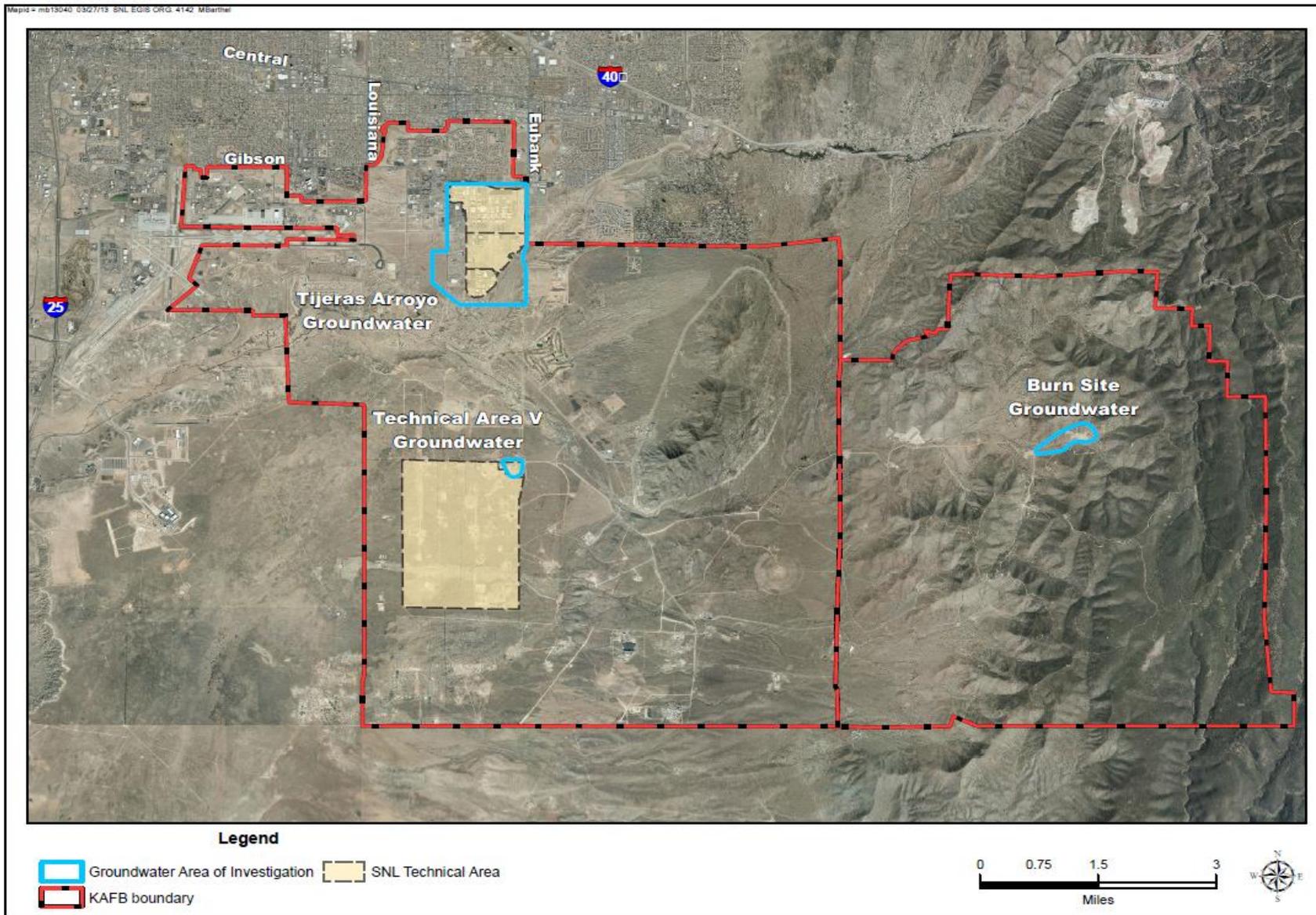
→ 3 Groundwater Areas of Concern (AOCs)

Burn Site

Tijeras Arroyo

Technical Area V

Locations of 3 Groundwater AOCs on KAFB





Remaining 10 ER Sites

- 6 Soil sites (five plus one)
- 1 Mixed Waste Landfill
- 3 Groundwater Areas of Concern



Burn Site

Tijeras Arroyo

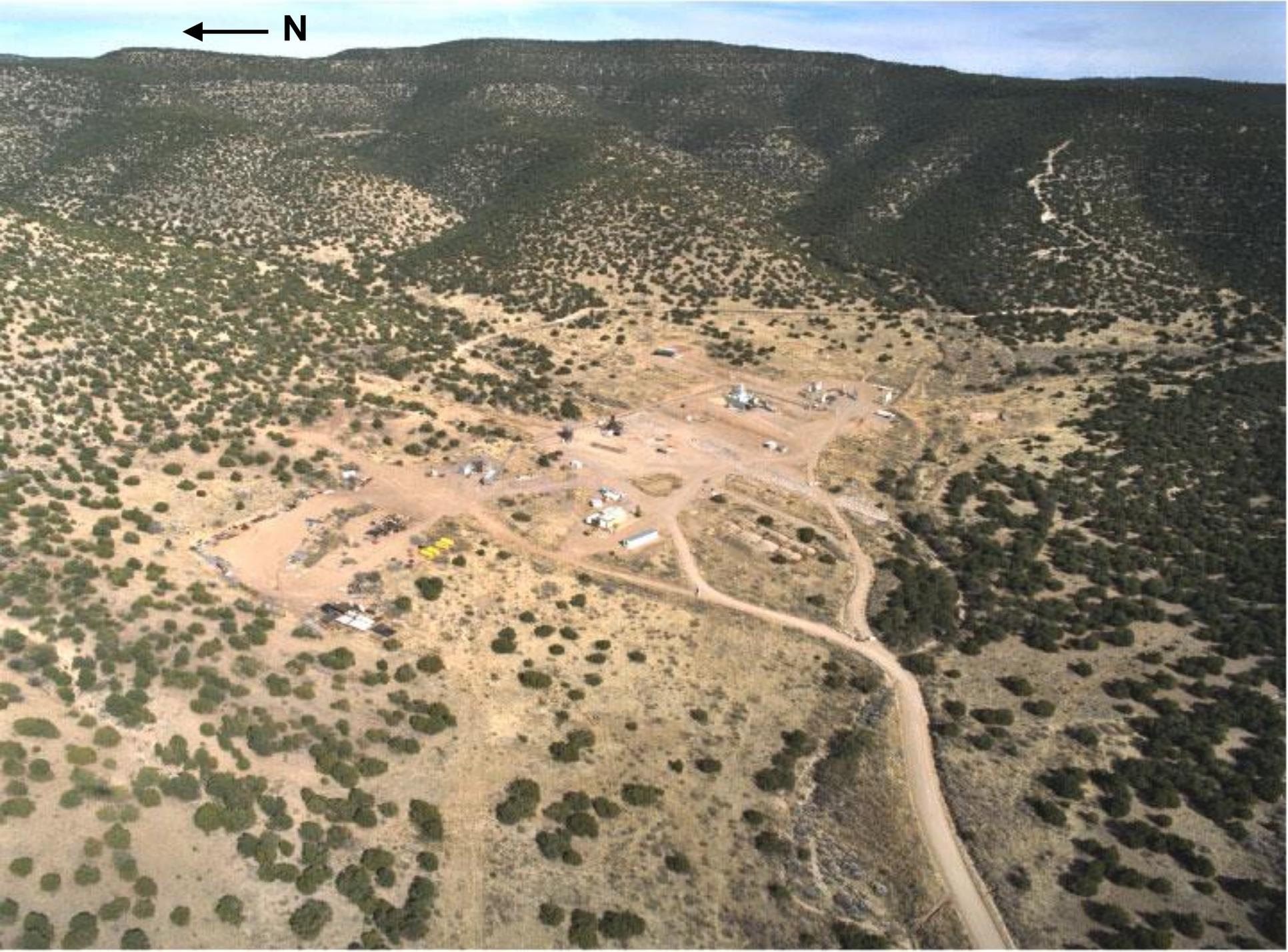
Technical Area V

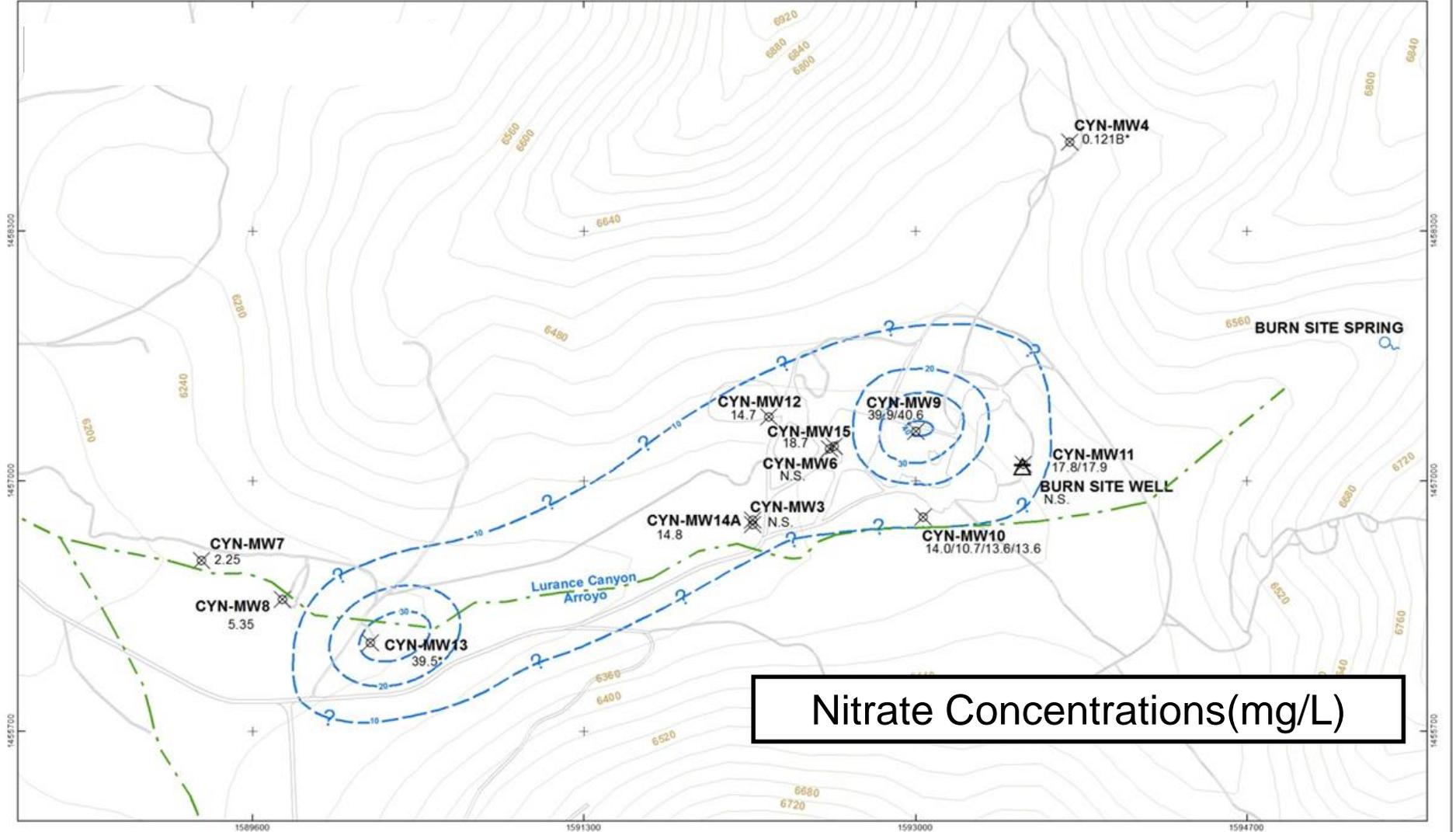


Burn Site GW AOC

- GW occurs in fractured bedrock
- Depth to GW varies from 108 to 326 ft. below surface
- GW contains nitrate, up to 42 ppm (regulatory standard is 10 ppm)
- Currently conducting weight-of-evidence process to determine origin of nitrate
- As part of weight-of-evidence process, we will submit an Aquifer Pump Test Workplan to NMED by June 8, 2016
- Continuing to monitor the GW

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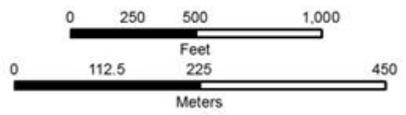




Legend

- Groundwater Monitoring Well, with December 2014, Nitrate plus Nitrite Concentrations (mg/L). N.S. denotes not sampled. *Asterik denotes June 2014 sample.
- Spring
- Unpaved Road
- Arroyo
- Production Well (non-potable)
- 40-ft. Contour
- Concentration Contour (mg/L) (dashed where inferred; queried where uncertain)

Sandia National Laboratories, New Mexico
Environmental Geographic Information System



New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum





Remaining 10 ER Sites

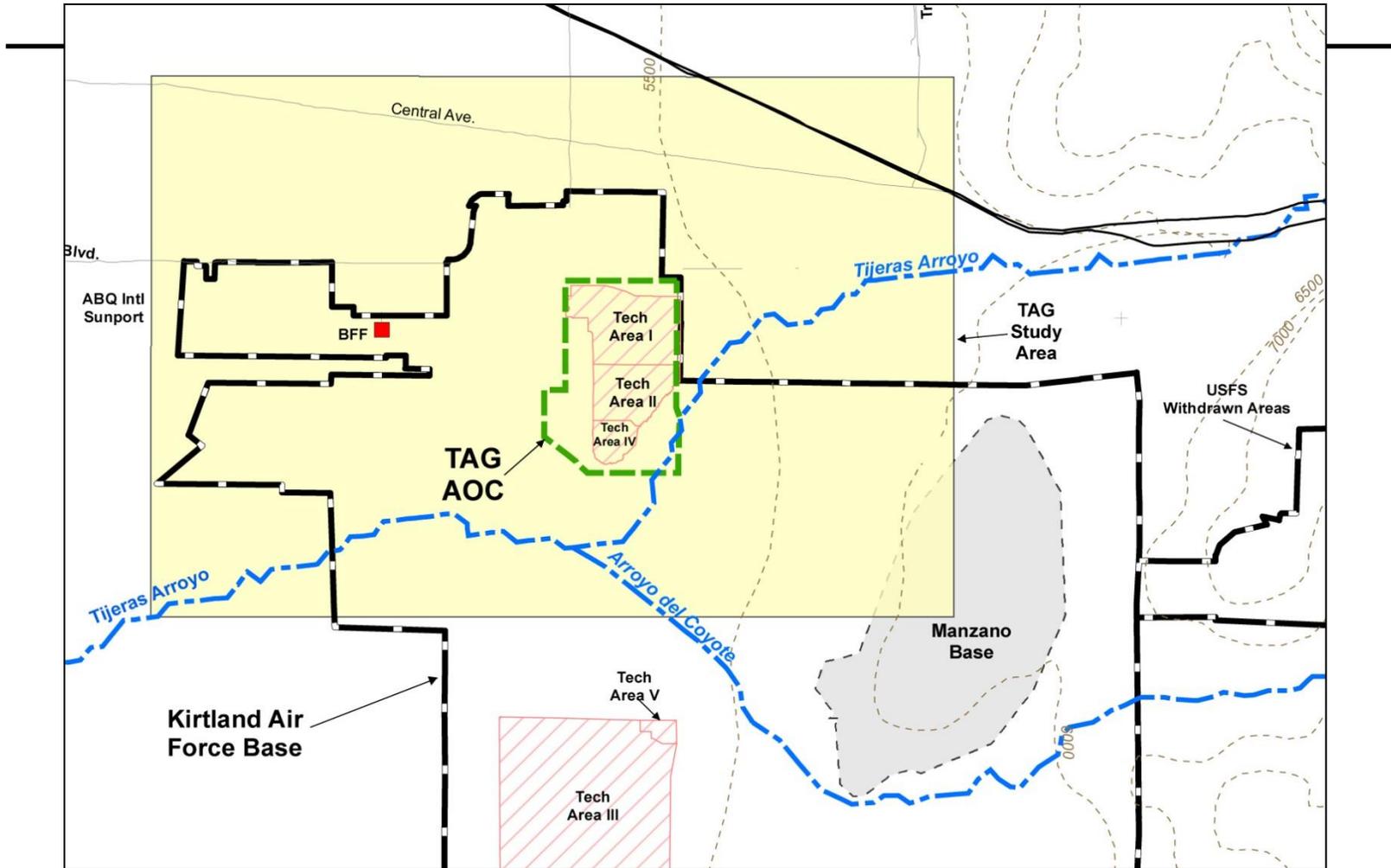
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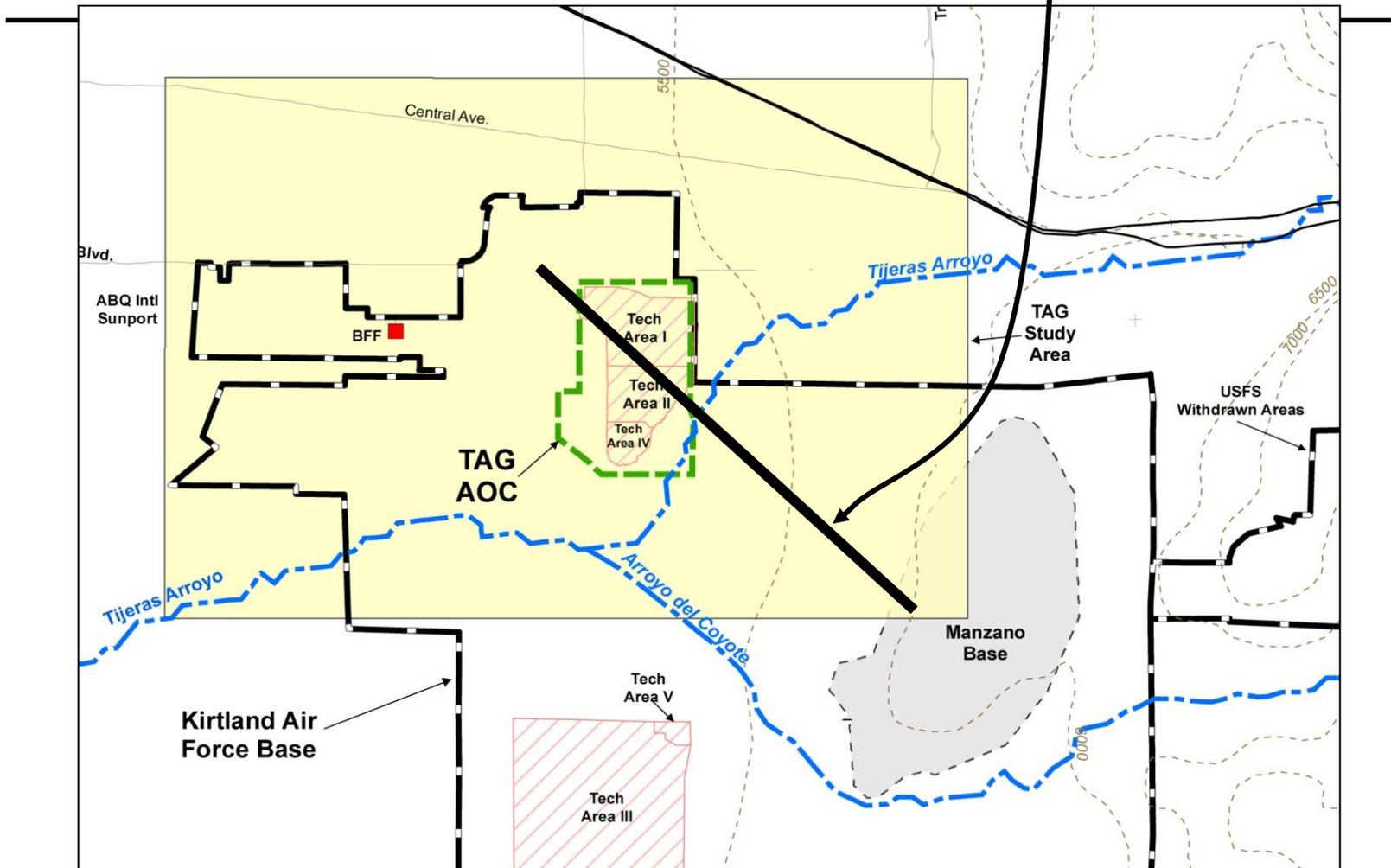
Tijeras Arroyo Groundwater AOC

- Perched GW occurs:
 - ~250 ft. below surface, and
 - ~ 250 ft above regional aquifer
- Perched GW contaminated with nitrate & trichloroethylene (TCE)
 - Nitrate: up to 39 ppm (regulatory standard is 10 ppm)
 - TCE: up to 9 ppb (regulatory standard is 5 ppb)
- Updating the 2005 Corrective Measure Evaluation (CME) Report with new data
- Updated CME Report to NMED by December 2, 2016
- Continuing to monitor the GW

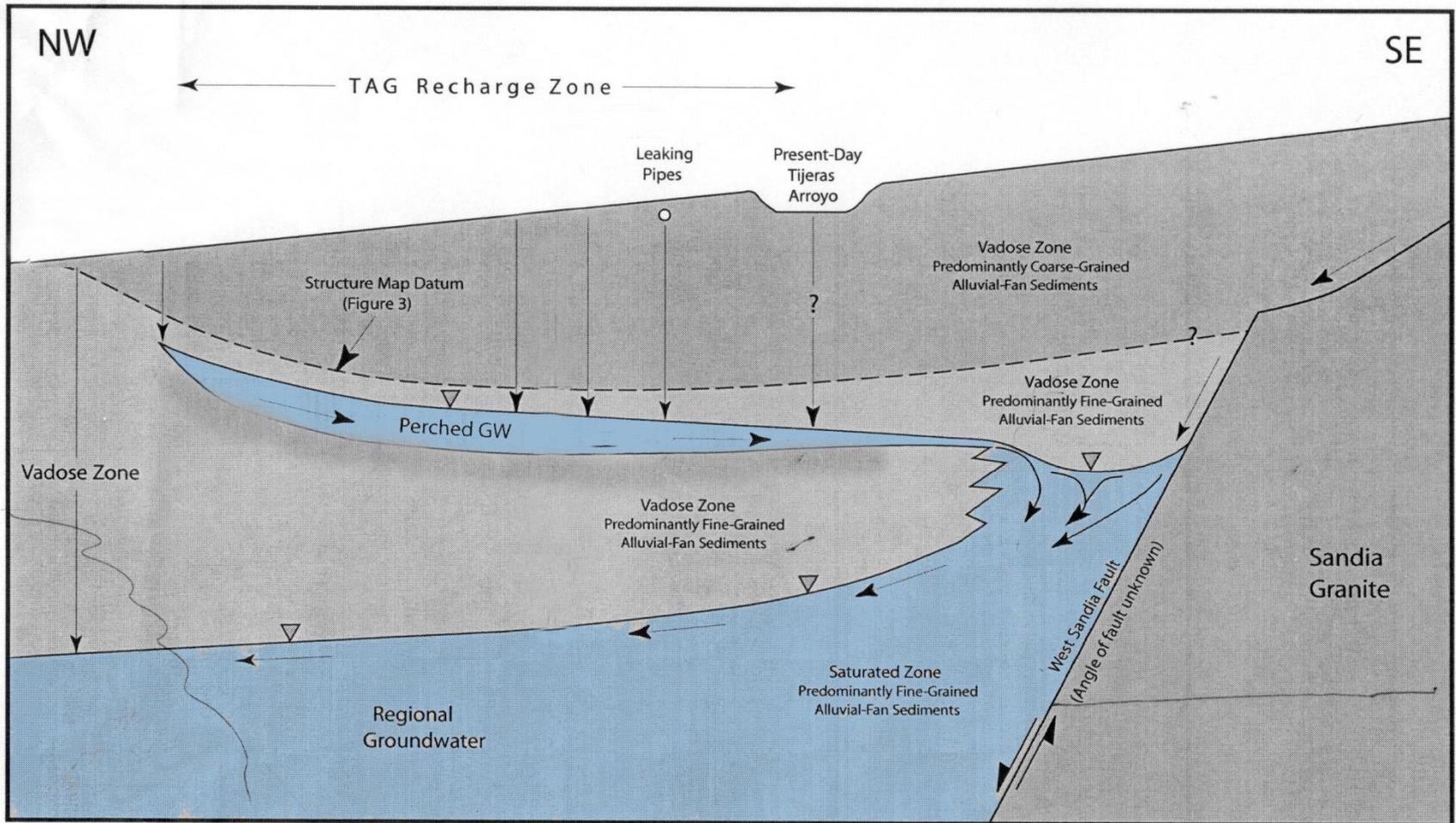
Location of Tijeras Arroyo Groundwater AOC



Cross-Section of Tijeras Arroyo Groundwater AOC



Conceptual Model of Tijeras Arroyo Groundwater AOC





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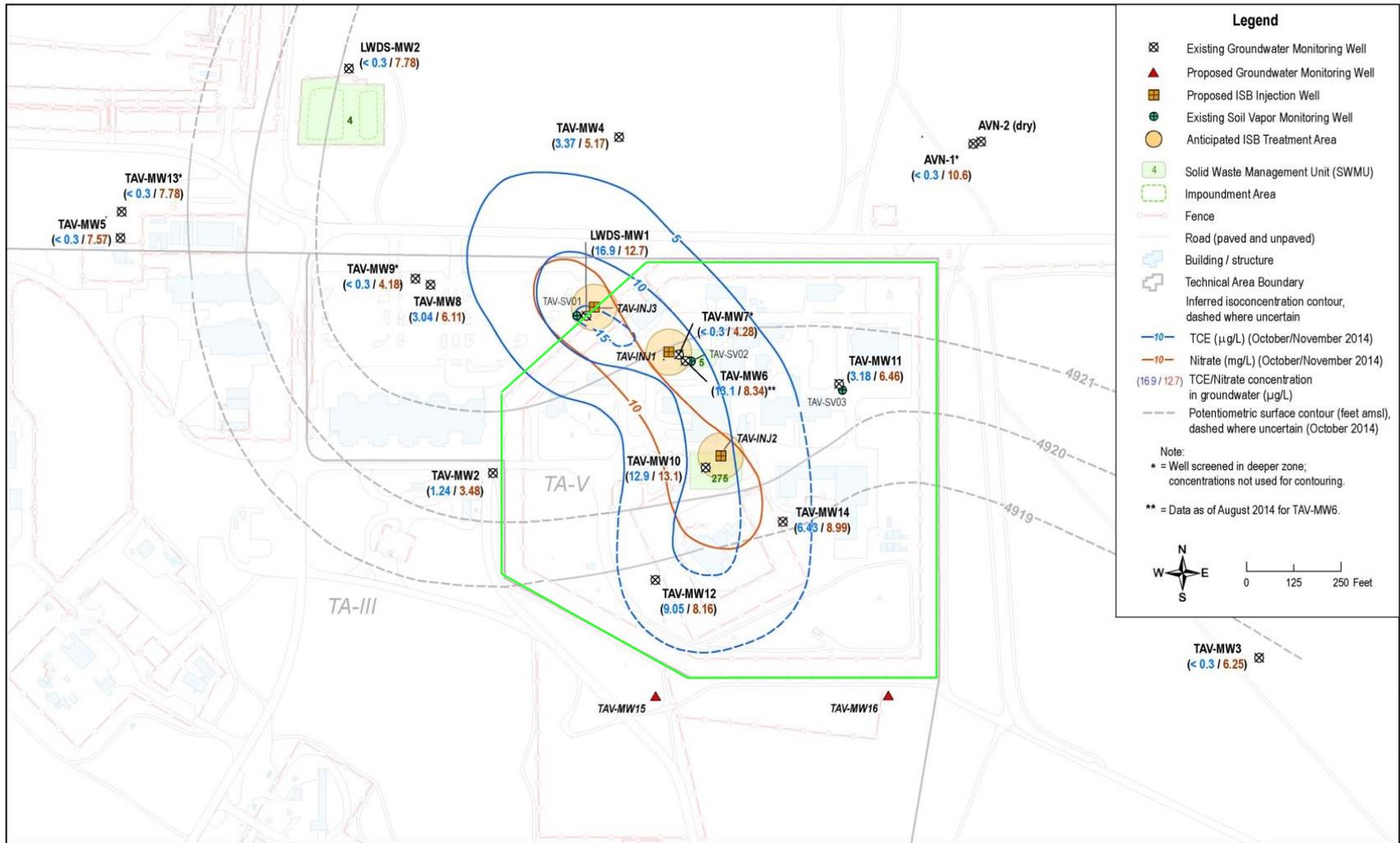
Technical Area V GW AOC

- Regional GW occurs 500 ft. below surface
- Contaminated with nitrate and TCE
 - Nitrate: up to 14 ppm (regulatory standard is 10 ppm)
 - TCE: up to 19 ppb (regulatory standard is 5 ppb)
- Plan to conduct phased Treatability Study to evaluate effectiveness of in-situ bio-remediation as technology to remediate contamination
- Treatability Study Workplan submitted to NMED on October 20, 2015
- NMED requested modifications and the Treatability Study Workplan was re-submitted to NMED on March 18, 2016

Aerial Oblique of Technical Area V (view to southwest)



TA-V TCE & Nitrate Contamination with Treatability Study Injection Wells Locations



Phases of TA-V Treatability Study





Summary of Progress of Sandia's ER Operations

- Received Certificates of Completion for 6 soil sites
- Secretary of Environment issued the Final Order granting the status of “Corrective Action Complete with Controls” to the MWL
- Conducting weight-of-evidence process at Burn Site GW AOC
- Updating CME Report on Tijeras Arroyo GW AOC
- Resubmitted Treatability Study Workplan to NMED for the TA-V GW AOC



Overview of Work Scheduled for FY 2017

- Work Scheduled:
 - Participate in Correction Action Complete regulatory process for ER Sites 8/58, 68, 146, 154 and 502
 - Begin field portion of TA-V groundwater treatability study
 - Conduct Aquifer Pump Test at Burn Site
 - Submit Corrective Measure Evaluation Report for Tijeras Arroyo to NMED



More Information & Questions

- On-line information ER documents hosted by NMED - <http://www.nmenv.state.nm.us/HWB/snlperm.html>
- On-line collection of ER documents hosted by UNM's Lobo Vault - <http://repository.unm.edu/handle/1928/10963>
- Annual Groundwater Monitoring Report for Sandia Labs - http://www.sandia.gov/news/publications/environmental_reports/index.html
- Send email questions to - envinfo@sandia.gov



Backup Slides

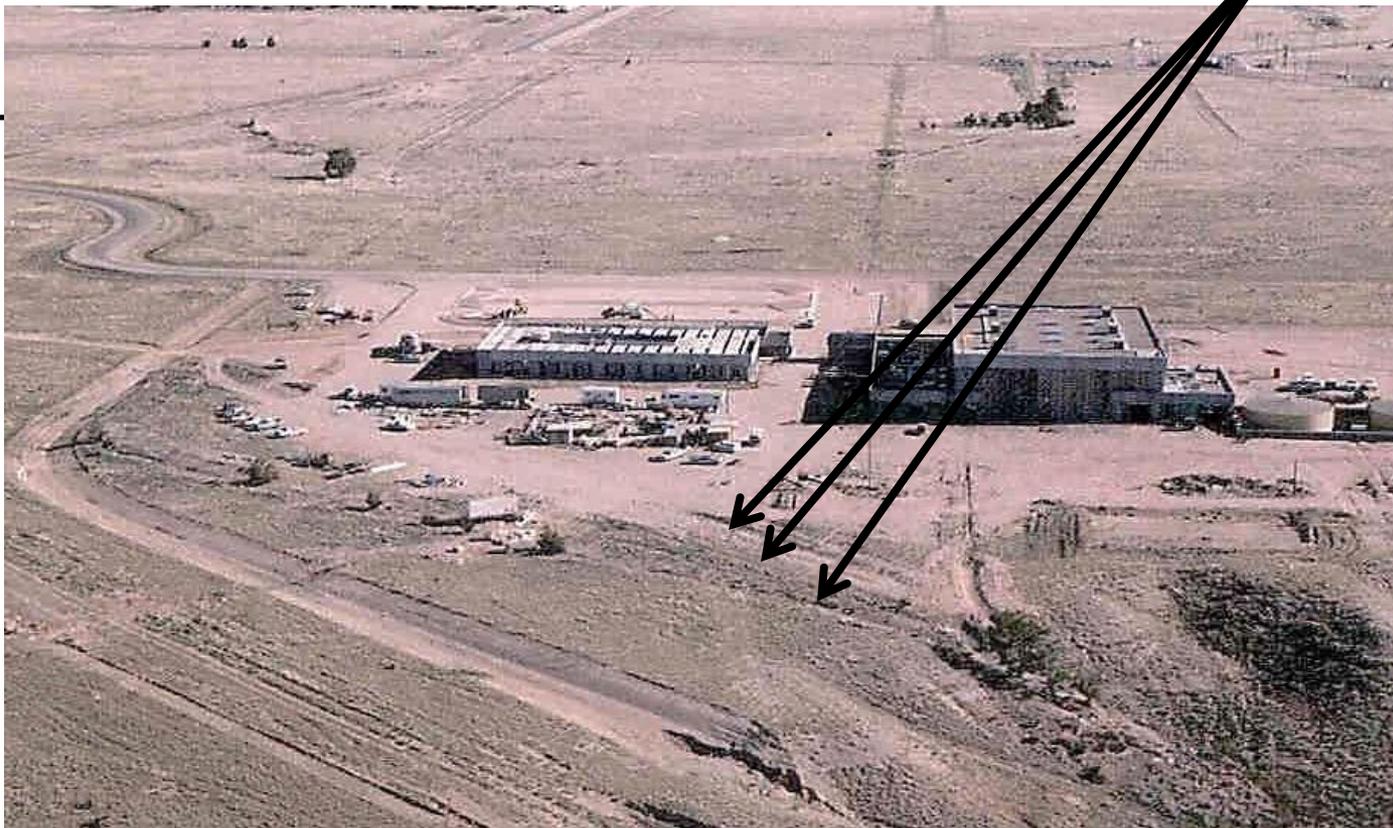


SWMU 46

Old Acid Waste Line Outfall

- SWMU 46 consists of 3 unlined outfall ditches:
 - Received effluent from the Old Acid Waste Line & drained to rim of Tijeras Arroyo
 - First outfall ditch was constructed approximately 1948
 - Second, and parallel ditch was constructed about 1950
 - Third ditch was constructed in the mid-1960s
- The Old Acid Waste Line connected to research laboratories, machine shops, a paint shop, an electroplating shop, a foundry, and a photographic processing laboratory
- Late 1960s, estimated discharge was 130,000 gallons per day
- Discharges stopped and ditches filled about 1974

Three SWMU 46 outfall ditches faintly visible

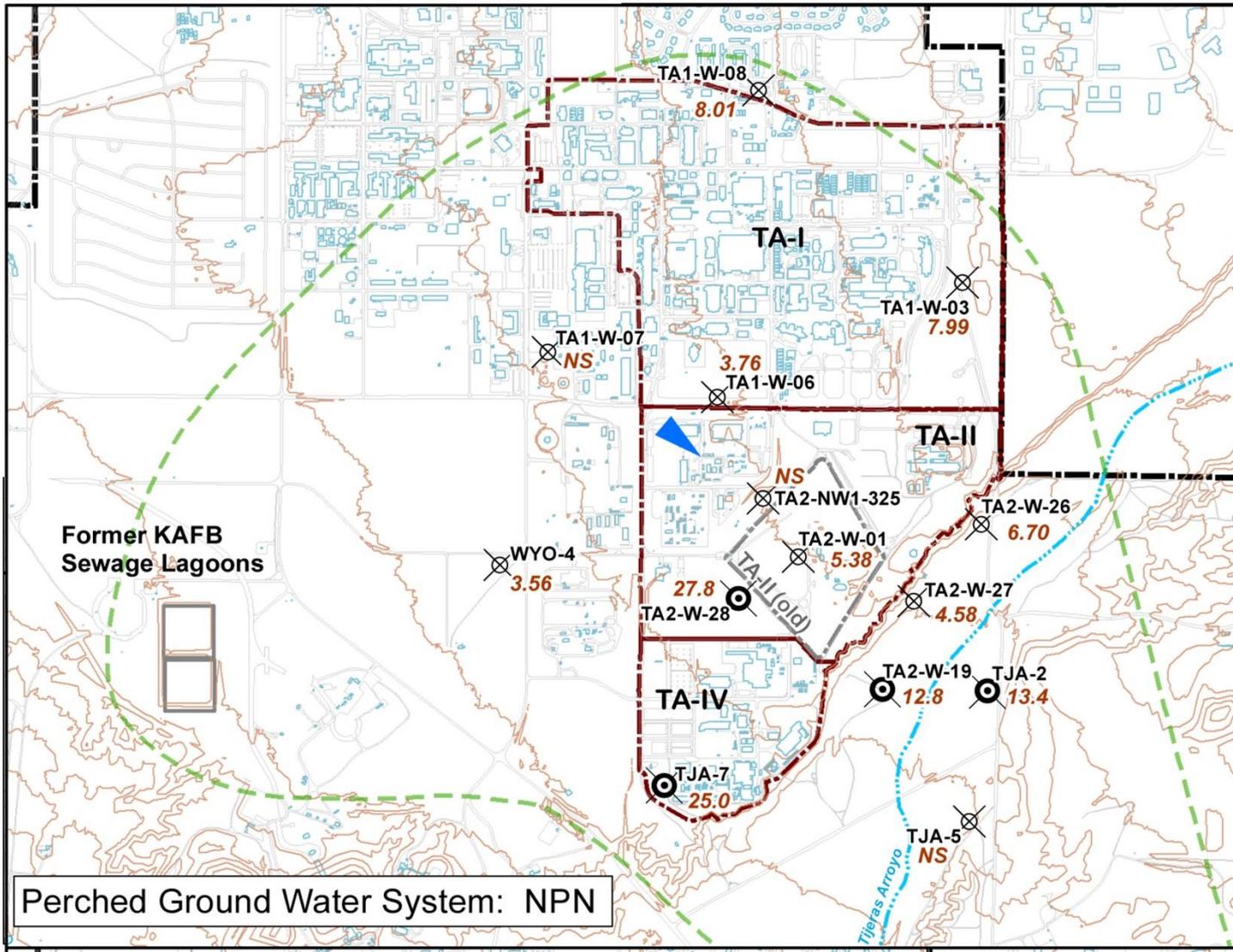


**Photograph showing TA-IV and Building 980 in 1978.
Current storm water ditch is at lower left corner.**



Corrective Action is Complete

- Significant soil sampling program (327 samples) with analysis for metals, VOCs, SVOCs, PCBs, HE compounds, and radionuclides beginning in 2001
- Voluntary Corrective Measure to remove PCB-contaminated soils in 2003
- February 26, 2015 granted status of Corrective Action Complete with Controls



Legend

- SNL/NM Groundwater Monitoring Well
- Monitoring well with exceedance of the Maximum Contaminant Limit in CY 2015
- Maximum concentration per monitoring well in CY 2015:
 - 33.0 Nitrate plus Nitrite (NPN) (mg/L)
 - 8.10 Trichloroethene (TCE) (ug/L)
- ND** Not Detected
- NS** Not Sampled
- Groundwater Flow direction, inferred from potentiometric surface figures
- Lateral extent of Perched Ground Water System
- Surface drainage, arroyo
- Road, paved and unpaved
- Ground surface contour (20 ft)
- Building / Structure
- Former KAFB sewage lagoons
- Technical Area (TA) boundary
- Kirtland Air Force Base (KAFB) boundary

0 2,500 5,000
Feet

0 630 1,260
Meters

Sanlida National Laboratories | SNL EGIS ORG.4142
New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

SNL, EGIS Dept 4142 ce16513 3-21-16 / mb14074

Summary of Long-Term Monitoring Parameters, Frequencies, and Methods Mixed Waste Landfill, Sandia National Laboratories, New Mexico

Sampling Media	Monitoring Parameters/ Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Locations	Monitoring Method	Comments
Air	Radon	Year 1 – Quarterly Year 2 – Quarterly Year 3 – Semiannual Year 4 – Semiannual Year 5 and subsequent years – Annual	17	10 detectors placed at corners and midpoints of perimeter fence 5 detectors placed on completed cover 2 detectors at background locations (TBD)	Track-etch detectors (at breathing level); sampling and analysis per Appendix C	Samples are time-weighted average and will be collected over a 3-month period.
Surface Soil	Tritium	Annual	4	One sample collected from each corner of the MWL ET Cover.	Grab samples of soil collected; moisture extracted and analyzed for tritium using liquid scintillation	Samples will continue to be collected from the original MWL ground surface at the four corners of the ET Cover.
Vadose Zone	VOCs in soil vapor	Year 1 – Semiannual Year 2 – Semiannual Year 3 – Semiannual Year 4 and subsequent years – Annual	17	Samples collected from 3 perimeter multi-port FLUTe™ or equivalent wells (5 sampling ports per well) and 2 single-port soil-vapor monitoring points installed through the ET Cover	Sampling and analysis per Appendix D (Compendium Method TO-15 or equivalent). Table 3.4.1-1 presents list of analytes	The 3 multipoint FLUTe™ wells or equivalent are proposed and located at the MWL perimeter. Sampling ports planned for depths of 50, 100, 200, 300, and 400 ft bgs. The 2 single-port soil-vapor monitoring points have a sampling port approximately 35 ft below the original ground surface.
Vadose Zone	Moisture content underneath the ET Cover	Year 1 – Semiannual Year 2 – Semiannual Year 3 and subsequent years – Annual	171	3 soil-moisture monitoring access tubes Measurements obtained at 1-ft increments from 4 ft to 25 ft bgs, then 5-ft increments to total depth of the access tube (200 linear ft)	Soil-moisture monitoring per Appendix E	Moisture content in vadose zone beneath the cover is measured using a neutron probe to evaluate moisture infiltration through the ET Cover.

Summary of Long-Term Monitoring Parameters, Frequencies, and Methods Mixed Waste Landfill, Sandia National Laboratories, New Mexico

Sampling Media	Monitoring Parameters/ Constituents of Concern	Monitoring Frequency ^a	Number of Samples Per Event	Locations	Monitoring Method	Comments
Ground water	VOCs, metals, tritium, radon, gamma-emitting radionuclides (short list), and gross alpha/beta activity	Semiannual	4	MWL compliance groundwater monitoring well network: MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9	Sampling and Analysis per Appendix F. Table 3.5.4-1 lists specific analytes and EPA Methods ^b	Monitoring wells MWL-MW4, MWL-MW5, and MWL-MW6 will be retained for information only.
Biota – Surface Soil	RCRA Metals plus Cu, Ni, V, Zn, Co, and Be; and gamma-emitting radionuclides (short list)	Annual	Up to 4 (2 each, if they exist)	Variable - ant hills and animal burrows on the MWL ET Cover located during ET Cover inspections, if present	Grab sampling and analysis of surface soil at animal burrow and/or ant hill feature per Appendix G	Soil sampling will be performed in August or September to evaluate potential for mobilization of contaminants by biota. If no features are identified, no samples will be collected.
Biota – Cover Vegetation	Gamma-emitting radionuclides (short list) in vegetation	Annual	Up to 2 if they exist	Variable - potentially deep-rooted vegetation overlying former disposal areas located during ET Cover inspections, if present	Grab sampling and analysis of vegetation, including the plant and root system per Appendix G	Vegetation sampling will be performed in August or September to evaluate potential for mobilization of contaminants by plants. If no potentially deep-rooted plants are present, no samples will be collected.